

# Lecture Notes in Computer Science

9416

*Commenced Publication in 1973*

Founding and Former Series Editors:

Gerhard Goos, Juris Hartmanis, and Jan van Leeuwen

## Editorial Board

David Hutchison

*Lancaster University, Lancaster, UK*

Takeo Kanade

*Carnegie Mellon University, Pittsburgh, PA, USA*

Josef Kittler

*University of Surrey, Guildford, UK*

Jon M. Kleinberg

*Cornell University, Ithaca, NY, USA*

Friedemann Mattern

*ETH Zurich, Zürich, Switzerland*

John C. Mitchell

*Stanford University, Stanford, CA, USA*

Moni Naor

*Weizmann Institute of Science, Rehovot, Israel*

C. Pandu Rangan

*Indian Institute of Technology, Madras, India*

Bernhard Steffen

*TU Dortmund University, Dortmund, Germany*

Demetri Terzopoulos

*University of California, Los Angeles, CA, USA*

Doug Tygar

*University of California, Berkeley, CA, USA*

Gerhard Weikum

*Max Planck Institute for Informatics, Saarbrücken, Germany*

More information about this series at <http://www.springer.com/series/7409>

Ioana Ciuciu · Hervé Panetto  
Christophe Debruyne · Alexis Aubry  
Peter Bollen · Rafael Valencia-García  
Alok Mishra · Anna Fensel  
Fernando Ferri (Eds.)

# On the Move to Meaningful Internet Systems: OTM 2015 Workshops

Confederated International Workshops:  
OTM Academy, OTM Industry Case Studies Program,  
EI2N, FBM, INBAST, ISDE, META4eS, and MSC 2015  
Rhodes, Greece, October 26–30, 2015  
Proceedings

### *Editors*

Ioana Ciuciu  
University Babes-Bolyai  
Cluj-Napoca  
Romania

Hervé Panetto  
University of Lorraine  
Vandoeuvre-les-Nancy  
France

Christophe Debruyne  
Trinity College Dublin  
Dublin 2  
Ireland

Alexis Aubry  
University of Lorraine  
Vandoeuvre-les-Nancy  
France

Peter Bollen  
Maastricht University  
MD Maastricht  
The Netherlands

Rafael Valencia-García  
Universidad de Murcia  
Murcia  
Spain

Alok Mishra  
Atılım University  
Ankara  
Turkey

Anna Fensel  
University of Innsbruck  
Innsbruck  
Austria

Fernando Ferri  
National Research Council  
Rome  
Italy

ISSN 0302-9743

Lecture Notes in Computer Science

ISBN 978-3-319-26137-9

DOI 10.1007/978-3-319-26138-6

ISSN 1611-3349 (electronic)

ISBN 978-3-319-26138-6 (eBook)

Library of Congress Control Number: 2015953246

LNCS Sublibrary: SL3 – Information Systems and Applications, incl. Internet/Web, and HCI

Springer Cham Heidelberg New York Dordrecht London

© Springer International Publishing Switzerland 2015

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, express or implied, with respect to the material contained herein or for any errors or omissions that may have been made.

Printed on acid-free paper

Springer International Publishing AG Switzerland is part of Springer Science+Business Media  
([www.springer.com](http://www.springer.com))

## **General Co-Chairs' Message for OnTheMove 2015, Rhodes, Greece**

The OnTheMove 2015 event held during October 26–30, in Rhodes, Greece, further consolidated the importance of the series of annual conferences that was started in 2002 in Irvine, California. It then moved to Catania, Sicily, in 2003, to Cyprus in 2004 and 2005, Montpellier in 2006, Vilamoura in 2007 and 2009, in 2008 to Monterrey, Mexico, to Heraklion, Crete, in 2010 and 2011, Rome in 2012, Graz in 2013, and Amantea, Italy, in 2014. This prime event continues to attract a diverse and relevant selection of today's research worldwide on the scientific concepts underlying new computing paradigms, which of necessity must be distributed, heterogeneous, and supporting an environment of resources that are autonomous yet must meaningfully cooperate. Indeed, as such large, complex, and networked intelligent information systems become the focus and norm for computing, there continues to be an acute and even increasing need to address the implied software, system, and enterprise issues and discuss them face to face in an integrated forum that covers methodological, semantic, theoretical, and application issues as well. As we all realize, e-mail, the Internet, and even video conferences on their own are not optimal or even sufficient for effective and efficient scientific exchange.

The OnTheMove (OTM) Federated Conference series was created precisely to cover the scientific exchange needs of the communities that work in the broad yet closely connected fundamental technological spectrum of Web-based distributed computing. The OTM program every year covers data and Web semantics, distributed objects, Web services, databases, information systems, enterprise workflow and collaboration, ubiquity, interoperability, mobility, as well as grid and high-performance computing.

OTM does *not* consider itself a so-called multi-conference event but instead is proud to give meaning to the “federated” aspect in its full title<sup>1</sup>. It aspires to be a primary scientific meeting place where all aspects of research and development of Internet- and intranet-based systems in organizations and for e-business are discussed in a scientifically motivated way, in a forum of loosely interconnected workshops and conferences. This year's 14th edition of the OTM Federated Conferences event therefore once more provided an opportunity for researchers and practitioners to understand, discuss, and publish these developments within the broader context of distributed, ubiquitous computing. To further promote synergy and coherence, the main conferences of OTM 2015 were conceived against a background of three interlocking global themes:

- Trusted Cloud Computing Infrastructures Emphasizing Security and Privacy
- Technology and Methodology for Data and Knowledge Resources on the (Semantic) Web

---

<sup>1</sup> On The Move Towards Meaningful Internet Systems and Ubiquitous Computing – Federated Conferences and Workshops.

- Deployment of Collaborative and Social Computing for and in an Enterprise Context

Originally the federative structure of OTM was formed by the co-location of three related, complementary, and successful main conference series: DOA (Distributed Objects and Applications, held since 1999), covering the relevant infrastructure-enabling technologies, ODBASE (Ontologies, DataBases and Applications of SEmantics, since 2002), covering Web semantics, XML databases, and ontologies, and of course CoopIS (Cooperative Information Systems, held since 1993), which studies the application of these technologies in an enterprise context through, e.g., workflow systems and knowledge management. In the 2011 edition, security issues, originally started as topics of the IS workshop in OTM 2006, became the focus of DOA as secure virtual infrastructures, further broadened to cover aspects of trust and privacy in so-called cloud-based systems. As this latter aspect came to dominate agendas in this and overlapping research communities, we decided in 2014 to rename the event as the Cloud and Trusted Computing (C&TC) conference, and to organize and launch it in a workshop format to define future editions.

Both main conferences specifically seek high-quality contributions of a more mature nature and encourage researchers to treat their respective topics within a framework that simultaneously incorporates (a) theory, (b) conceptual design and development, (c) methodology and pragmatics, and (d) application in particular case studies and industrial solutions.

As in previous years we again solicited and selected additional quality workshop proposals to complement the more mature and “archival” nature of the main conferences. Our workshops are intended to serve as “incubators” for emergent research results in selected areas related, or becoming related, to the general domain of Web-based distributed computing. This year the difficult and time-consuming job of selecting and coordinating the workshops was brought to a successful end by Ioana Ciuciu, and we were very glad to see that some of our earlier successful workshops (EI2N, META4eS, ISDE, INBAST, MSC) re-appeared in 2015, in some cases in alliance with other older or newly emerging workshops. The new Fact-Based Modeling (FBM) workshop succeeded and expanded the scope of the successful ORM workshop. The Industry Case Studies Program, started in 2011 under the leadership of Hervé Panetto and OMG's Richard Mark Soley, further gained momentum and visibility in its fifth edition this year.

The OTM registration format (“one workshop or conference buys all workshops or conferences”) actively intends to promote synergy between related areas in the field of distributed computing and to stimulate workshop audiences to productively mingle with each other and, optionally, with those of the main conferences. In particular EI2N continues to create and exploit a visible cross-pollination with CoopIS.

We were happy to see that also in 2015 the number of quality submissions for the OnTheMove Academy (OTMA) stabilized for the fourth consecutive year. OTMA implements our unique, actively coached and therefore very time- and effort-intensive formula to bring PhD students together, and aims to carry our “vision for the future” in research in the areas covered by OTM. Its 2015 edition was organized and managed by

a dedicated team of collaborators and faculty, Peter Spyns, Maria-Esther Vidal, Anja Metzner, and Alfred Holl, inspired as always by the OTMA Dean, Erich Neuhold.

In the OTM Academy, PhD research proposals are submitted by students for peer review; selected submissions and their approaches are to be presented by the students in front of a wider audience at the conference, and are independently and extensively analyzed and discussed in front of this audience by a panel of senior professors. One will readily appreciate the resources invested in this by OnTheMove and especially the OTMA faculty!

As the three main conferences and the associated workshops all share the distributed aspects of modern computing systems, they experience the application pull created by the Internet and by the so-called Semantic Web, in particular developments of big data, increased importance of security issues, and the globalization of mobile-based technologies. For ODBASE 2015, the focus continued to be the knowledge bases and methods required for enabling the use of formal semantics in Web-based databases and information systems. For CoopIS 2015, the focus as before was on the interaction of such technologies and methods with business process issues, such as occur in networked organizations and enterprises. These subject areas overlap in a scientifically natural and fascinating fashion and many submissions in fact also covered and exploited the mutual impact among them. For our C&TC 2015 event, its primary emphasis was again squarely put on the virtual and security aspects of Web-based computing in the broadest sense. As with the earlier OTM editions, the organizers wanted to stimulate this cross-pollination by a program of famous keynote speakers from academia and industry around the chosen themes and shared by all OTM component events. We are quite proud to list for this year:

- Michele Bezzi
- Eva Kühn
- John Mylopoulos
- Sjir Nijssen

The general downturn in submissions observed in recent years for almost all conferences in computer science and IT is also affecting OTM, but we were still fortunate to receive a total of 130 submissions for the three main conferences and 86 submissions in total for the workshops. Not only may we indeed again claim success in attracting a representative volume of scientific papers, many from the USA and Asia, but these numbers of course allowed the respective Program Committees to again compose a high-quality cross-section of current research in the areas covered by OTM. Acceptance rates vary but the aim was to stay consistently at about one accepted full paper for two to three submitted (nearly one in four for CoopIS), yet as always these rates are subordinated to professional peer assessment of proper scientific quality. As usual we have separated the proceedings into two volumes with their own titles, one for the main conferences and one for the workshops and posters, and we are again most grateful to the Springer LNCS team in Heidelberg for their professional support, suggestions, and meticulous collaboration in producing the files and indexes ready for downloading on the USB sticks.

The reviewing process by the respective OTM Program Committees was performed to professional quality standards: Each paper review in the main conferences was

assigned to at least three referees, with arbitrated e-mail discussions in the case of strongly diverging evaluations. It may be worthwhile to emphasize once more that it is an explicit OTM policy that all conference Program Committees and Chairs make their selections in a completely sovereign manner, autonomous and independent from any OTM organizational considerations. As in recent years, proceedings in paper form are now only available to be ordered separately.

The General Chairs are once more especially grateful to the many people directly or indirectly involved in the set-up of these federated conferences. Not everyone realizes the large number of persons that need to be involved, and the huge amount of work, commitment, and in the uncertain economic and funding climate of 2015 certainly also financial risk that is entailed by the organization of an event like OTM. Apart from the persons in their aforementioned roles we therefore wish to thank in particular explicitly our main conference Program Committee Chairs:

- CoopIS 2015: Georg Weichhart, with Heiko Ludwig and Michael Rosemann
- ODBASE 2015: Yuan An, with Min Song and Markus Strohmaier
- C&TC 2015: Claudio Ardagna, with Meiko Jensen

And similarly we thank the Program Committee (Co-)Chairs of the 2015 ICSP, OTMA, and Workshops (in their order of appearance on the website): Peter Spyns, Maria-Esther Vidal, Arne J. Berre, Gregoris Mentzas, Nadia Abchiche-Mimouni, Alexis Aubry, Fenareti Lampathaki, Eduardo Rocha Loures, Milan Zdravkovic, Peter Bollen, Hans Mulder, Maurice Nijssen, Miguel Ángel Rodríguez-García, Rafael Valencia García, Thomas Moser, Ricardo Colomo Palacios, Alok Mishra, Deepti Mishra, Jürgen Münch, Ioana Ciuciu, Christophe Debruyne, Anna Fensel, Maria Chiara Caschera, Fernando Ferri, Patrizia Grifoni, Arianna D'Ulizia, Mustafa Jarrar, António Lucas Soares, Cristovão Sousa.

Together with their many Program Committee members, they performed a superb and professional job in managing the difficult yet existential process of peer review and selection of the best papers from the harvest of submissions. We all also owe a significant debt of gratitude to our supremely competent and experienced Conference Secretariat and technical support staff in Guadalajara, Brussels, and Dublin, respectively, Daniel Meersman, Jan Demey, and Christophe Debruyne.

The General Conference and Workshop Co-Chairs also thankfully acknowledge the academic freedom, logistic support, and facilities they enjoy from their respective institutions — Technical University of Graz, Austria; Université de Lorraine, Nancy, France; Latrobe University, Melbourne, Australia; and Babes-Bolyai University, Cluj, Romania — without which such a project quite simply would not be feasible. We do hope that the results of this federated scientific enterprise contribute to your research and your place in the scientific network. We look forward to seeing you at next year's event!

September 2015

Robert Meersman  
Hervé Panetto  
Tharam Dillon  
Ernesto Damiani  
Ioana Ciuciu



# Organization

OTM (On The Move) is a federated event involving a series of major international conferences and workshops. These proceedings contain the papers presented at the OTM Academy 2015, the OTM Industry Case Studies Program 2015, the OTM 2015 federated workshops, and the OTM 2015 federated conferences poster papers.

## Executive Committee

### General Co-Chairs

Robert Meersman	TU Graz, Austria
Hervé Panetto	University of Lorraine, France
Ioana Ciuciu	University Babes-Bolyai Cluj, Romania

### OnTheMove Academy Dean

Erich Neuhold	University of Vienna, Austria
---------------	-------------------------------

### OnTheMove Academy Organizing Chairs

Peter Spyns	Vrije Universiteit Brussel, Belgium
Maria Esther Vidal	Universidad Simón Bolívar, Caracas, Venezuela

### Industry Case Studies Program Chair

Hervé Panetto	University of Lorraine, France
---------------	--------------------------------

### EI2N 2015 PC Co-Chairs

Alexis Aubry	University of Lorraine, France
Eduardo Rocha Loures	PUC Parana, Brazil
Fenareti Lampathaki	National Technical University of Athens, Greece
Milan Zdravkovic	University of Niš, Serbia

### FBM 2015 PC Co-Chairs

Robert Meersman	T.U. Graz, Austria
Peter Bollen	University of Maastricht, The Netherlands
Maurice Nijssen	PNA, The Netherlands
Hans Mulder	VIAgroep, The Netherlands

### INBAST 2015 PC Co-Chairs

Rafael Valencia-García	Universidad de Murcia, Spain
Miguel Ángel Rodríguez-García	Universidad de Murcia, Spain

Ricardo Colomo Palacios	Østfold University College, Norway
Thomas Moser	St. Pölten University of Applied Sciences, Austria

### **ISDE 2015 PC Co-Chairs**

Alok Mishra	Atilim University, Turkey
Jürgen Münch	University of Helsinki, Finland
Deepti Mishra	Atilim University, Turkey

### **META4eS 2015 PC Co-Chairs**

Anna Fensel	STI Innsbruck, University of Innsbruck, Austria
Christophe Debruyne	Trinity College Dublin, Ireland
Ioana Ciuci	University Babes-Bolyai Cluj, Romania

### **MSC 2015 PC Co-Chairs**

Fernando Ferri	National Research Council, Italy
Patrizia Grifoni	National Research Council, Italy
Arianna D'Ulizia	National Research Council, Italy
Maria Chiara Caschera	National Research Council, Italy

### **Logistics Team**

Daniel Meersman

## **OTM Academy 2015 Program Committee**

Galia Angelova	Avigdor Gal
Marcelo Arenas	Claudia Jiménez
Christoph Bussler	Frédéric Le Mouél
Paolo Ceravolo	Anja Metzner
Philippe Cudré-Mauroux	Erich Neuhold
Manu De Backer	Hervé Panetto
Dejing Dou	Erik Proper

## **Industry Case Studies 2015 Program Committee**

Michael Alexander	Ben Calloni
Sinuhe Arroyo	Luis Camarinha-Matos
Ian Bayley	Vincent Chapurlat
Peter Benson	Yannis Charalabidis
Gash Bhullar	David Cohen
Emmanuel Blanvillain	Eva Coscia
Serge Boverie	Tuan Dang
Dennis Brandl	Francesco Danza
Christoph Bussler	Michele Dassisti

Piero De Sabbata  
 Marc Delbaere  
 Jacques Durand  
 Dominique Ernadote  
 Donald Ferguson  
 Kurt Fessl  
 Sanford Friedenthal  
 Andres Garcia Higuera  
 Jean-Luc Garnier  
 Pascal Gendre  
 Ricardo Goncalves  
 Ted Goranson  
 Matthew Hause  
 Mathias Kohler  
 Sheron Koshy  
 Harald Kuehn  
 Antoine Lonjon  
 Peter Loos  
 Eduardo Loures  
 Gottfried Luef  
 Juan-Carlos Mendez  
 Arturo Molina

Jishnu Mukerji  
 Silvana Muscella  
 Yannick Naudet  
 Yasuyuki Nishioka  
 Ed Parsons  
 Andrea Persidis  
 Sobah Abbas Petersen  
 Daniel Sáez Domingo  
 Joe Salvo  
 Ayelet Sapir  
 Stan Schneider  
 Mark Schulte  
 Jean Simao  
 Dirk Slama  
 Richard Soley  
 Janos Sztipanovits  
 François Vernadat  
 Georg Weichhart  
 Lawrence Whitman  
 Detlef Zühlke  
 Milan Zdravkovic  
 Martin Zelm

## **EI2N 2015 Program Committee**

Hamideh Afsarmanesh  
 Spiros Alesakis  
 João P.A. Almeida  
 Dimitris Apostolou  
 Dimitris Askounis  
 Rafael Batres  
 Frederick Benaben  
 Giuseppe Berio  
 Peter Bernus  
 Nacer Boudjlida  
 Prasad Calyam  
 Luis Camarinha-Matos  
 Osiris Canciglieri  
 J. Cecil  
 Vincent Chapurlat  
 Yannis Charalabidis  
 David Chen  
 Michele Dassisti  
 Claudia Diamantini

Antonio Dourado Correia  
 Cesare Fantuzzi  
 Andres Garcia Higuera  
 Ted Goranson  
 Ricardo Jardim Goncalves  
 Roland Jochem  
 Ulrich Jumar  
 Udo Kannengiesser  
 Thomas Knothe  
 John Krogstie  
 Sotiris Koussouris  
 Oscar Lazaro  
 Mario Lezoche  
 Qing Li  
 Ivan Lukovic  
 Duta Luminita  
 Babis Magoutas  
 Andreia Malucelli  
 Zoran Marjanovic

Juan-Carlos Mendez  
Istvan Mezgár  
Michele Missikoff  
Néjib Moalla  
Yannick Naudet  
Shimon Nof  
Ovidiu Noran  
Angel Ortiz Bas  
Hervé Panetto  
Raul Poler  
Erik Proper  
David Romero Diaz  
Luca Settineri  
Richard Soley

Lawrence Stapleton  
Kamelia Stefanova  
Nenad Stefanovic  
Janusz Szpytko  
Miroslav Trajanovic  
Yannis Verginadis  
François Vernadat  
Gianluigi Viscusi  
Birgit Vogel-Heuser  
Xiaofang Wang  
Marek Wegrzyn  
Georg Weichhart  
Esma Yahia  
Martin Zelm

## **FBM 2015 Program Committee**

Roel Baardman  
Herman Balsters  
Ed Barkmeyer  
Marco Brattinga  
Cory Casanova  
Matthew Curland  
David Cuyler  
Diederik Dulfer  
Harald Eisenmann  
Gordon Everest  
William Frank  
Pat Hallock  
Terry Halpin  
Clifford Heath  
Stijn Hoppenbrouwers  
Paul Iske  
Mike Jackson  
Mustafa Jarrar  
Inge Lemmens  
Mariette Lokin  
Tony Morgan  
Ellen Munthe-Kaas  
David Newman  
Sjir Nijssen

Leo Oberst  
Baba Piprani  
Erik Proper  
Jos Rozendaal  
Pierre Schlag  
Robert Schmaal  
Hayo Schreijer  
John Sowa  
Peter Spyns  
Peter Straatsma  
Yan Tang  
Serge Valera  
Hans van Bommel  
Dirk van der Linden  
Robert van Doesburg  
Tom van Engers  
Jan Vanthienen  
Jos Vos  
Adrian Walker  
Miriam Wesselink  
Matthew West  
Jan Pieter Wijbenga  
Martijn Zoet  
Michael zur Muehlen

## **INBAST 2015 Program Committee**

Giner Alor-Hernández  
 Ghassan Beydoun  
 Robert Brown  
 Luis Omar Colombo-Mendoza  
 Sergio de Cesare  
 Christophe Debruyne  
 Fajar Juang Ekaputra  
 Jesualdo Tomás Fernández-Breis  
 Frederik Gailly  
 Francisco J. García-Peñalvo  
 Francisco García-Sánchez  
 Przemyslaw Kazienko  
 Antonio A. Lopez-Lorca  
 Catalina Martínez-Costa

Jose Antonio Miñarro-Giménez  
 Miroslav Minovic  
 Ana Muñoz  
 Petr Novák  
 José Luis Ochoa  
 Mario Andrés Paredes-Valerde  
 Oscar Pastor Lopez  
 Alejandro Rodríguez-González  
 Marta Sabou  
 Maria Pilar Salas-Zárate  
 Estefania Serral Asensio  
 Vladimir Stantchev  
 Wikan Danar Sunindyo  
 Reza Zamani

## **ISDE 2015 Program Committee**

Silvia Abrahao  
 M. Ali Babar  
 Nick Bessis  
 Barbara Carminati  
 Cagatay Catal  
 Ricardo Colomo-Palacios  
 Juan Garbajosa  
 Amar Gupta  
 Luis Iribarne  
 Orit Hazzan  
 Jukka Kääriäinen  
 Marco Kuhrmann  
 Casper Lassenius

Mahmood Niazi  
 Alexander Norta  
 Allen E. Milewski  
 Srinu Ramaswamy  
 Ita Richardson  
 Daniel Rodriguez  
 Kassem Saleh  
 Adel Taweel  
 June Verner  
 Deo Praksah Vidyarthi  
 Adam Wojciechowski  
 Ligu Yu

## **META4eS 2015 Program Committee**

Vladimir Alexiev  
 Adrian M.P. Brasoveanu  
 Stamati Dasiopoulou  
 Alina Dia Miron  
 Marin Dimitrov  
 Efstratios Kontopoulos  
 Vikash Kumar  
 Andrea Kő

Cosmin Lazar  
 Erik Mannens  
 Jorge Martinez-Gil  
 Georgios Meditskos  
 Camelia-M. Pintea  
 Maria Poveda Villalón  
 Christophe Roche  
 Dumitru Roman

Ana Roxin  
Magali Séguran  
Peter Spyns  
Thanos Stavropoulos

Doina Tatar  
Dia Trambitas  
Maria Esther Vidal  
Fouad Zablith

## **MSC 2015 Program Committee**

Frederic Andres  
Richard Chbeir  
Alessia D'Andrea  
Deborah Dahl  
Anna Formica  
Tiziana Guzzo  
Spyros Kokolakis  
Nikos Komninos

Claudia Linnhoff-Popien  
Stephen Marsh  
Nitendra Rajput  
Nicola Santoro  
Riccardo Torlone  
Fei-Yue Wang  
Adam Wojciechowski

# **OnTheMove 2015 Keynotes**

# **Data Semantics in the Days of Big Data**

John Mylopoulos

University of Trento, Italy

## **Short Bio**

John Mylopoulos holds a professor emeritus position at the Universities of Trento and Toronto. He earned a PhD degree from Princeton University in 1970 and joined the Department of Computer Science at the University of Toronto that year. His research interests include conceptual modelling, requirements engineering, data semantics, and knowledge management. Mylopoulos is a fellow of the Association for the Advancement of Artificial Intelligence (AAAI) and the Royal Society of Canada (Academy of Sciences). He has served as program/general chair of international conferences in artificial intelligence, databases and software engineering, including IJCAI (1991), Requirements Engineering (1997), and VLDB (2004). Mylopoulos is the recipient of an advanced grant from the European Research Council for a project titled “Lucretius: Foundations for Software Evolution.”

## **Talk**

“Data Semantics in the Days of Big Data”

In the good old days, the semantics of data was defined in terms of entities and relationships. For example, a tuple (widget:w#123, price: €10, date: 1970.07.30) in the SALES relation meant something like “widget w#123 was sold for €10 on July 30, 1970.” This simple view of semantics no longer applies in the days of big data, where gigabytes of data are pouring in every day and the intended meaning is defined in terms of strategic objectives such as, “We want to grow our sales by 2% over three years,” or tactical ones such as, “We want to grow sales for our clothing products by 2.5% over the next quarter in Lombardia.” We review some of the elements of this new perspective on data and present some of the analysis techniques that are emerging along with big data technologies.



# **Reusable Coordination Components: A Silver Bullet for Reliable Development of Cooperative Information Systems?**

Eva Kühn

TU Wien, Austria

## **Short Bio**

Eva Kühn graduated as an engineer of computer sciences, with a PhD, habilitation, and professor position at TU Wien. Heinz-Zemanek Research Award for PhD work on “Multi Database Systems”. She received a Kurt-Gödel Research Grant from the Austrian Government for a sabbatical at the Indiana Center for Databases at Purdue University, USA. She has several international publications and teaching experience in the areas of methods and tools for software development, software engineering, coordination languages, software integration, parallel and distributed programming, heterogeneous transaction processing, and space-based computing. Eva has been project coordinator of nationally (FWF, FFG, AT) and internationally (EU Commission) funded research projects as well as projects with industry. She has international software patents for research work on a new “Coordination System,” and seven years of experience as Chief Technological Officer (CTO) of an Austrian spin-off company for software development. Sue has served as conference chair, program committee member, organizer, and coordinator of international conferences. She is a member of the Governing Board of the Austrian and European UNIX systems user group, of the ISO Working Group for the standardization of Prolog, of the Senate of the Christian Doppler Forschungsgesellschaft (CDG), and of the Science and Research Council of the Federal State of Salzburg.

## **Talk**

“Reusable Coordination Components: A Silver Bullet for Reliable Development of Cooperative Information Systems?”

Today’s emerging trends such as factory of the future, big data, Internet of Things, intelligent traffic solutions, cyber-physical systems, wireless sensor networks, and smart home/city/grid raise major new challenges on software development. They are characterized by high concurrency, distribution, and dynamics as well as huge numbers of heterogeneous devices, resources, and users that must collaborate in a reliable way. The management of all interactions and dependencies between the participants is a

complex task posing massive coordination and integration problems. Must these be solved for each new application from scratch?

An alternative approach would be to identify similarities in their communication and synchronization behavior, to design corresponding “reusable patterns” with the help of a suitable and flexible coordination model, and finally to realize the patterns in the form of software components that run on a suitable middleware platform. In this keynote we discuss state-of-the-art coordination models and middleware systems to achieve this goal. The sharing of coordination components among different use cases on different platforms, reaching from energy-aware micro-controller platforms to enterprise server systems, is demonstrated by means of real-life scenarios from different domains. The vision is to compose advanced cooperative information systems from proven, configurable, reusable “coordination components,” thus reducing software development risks and costs.

# **Durable Modeling and Ever-Changing Implementation Technologies**

Sjir Nijssen

PNA Group, Netherlands

## **Short Bio**

Dr. Sjir Nijssen is an emeritus professor and has been CTO at PNA in The Netherlands ([www.pna-group.com](http://www.pna-group.com)) for the last 25 years. Dr. Nijssen first experienced the essential steps of working with facts in 1959 and 1960 while serving as a draft officer in the Royal Dutch Air Force, where at that time there was careful observation of planes of friends and enemies by boys on towers in the field, and girls plotting the information by the boys in one of the seven areas of The Netherlands, over telephone lines on a large table in atomic-free bunkers. The contents of the tables of the seven areas was verbalized by girls sitting at the next higher level and were then plotted by girls in the central command on a table covering the entire Netherlands. That information was used by the officers to direct interceptor planes. This was a world with very clear protocols on how to observe, how to formulate the facts, how to convert the facts into another representation of the facts on a land map table, verbalizing the information of the local tables into facts and transmitting these facts to the girls plotting the information read on the central table. Dr. Nijssen started with fact-based business communication modeling in the early 1970s, at Control Data's European headquarters in Brussels. Since then it has been more than his full-time occupation. It was there that NIAM (Natural language Information Analysis Method), a fact-based protocol to develop a conceptual schema and notation, was conceived. Prof. Robert Meersman was one of the pillars of the 22-person research lab at Control Data, from 1970 to 1982. From 1983, Dr. Nijssen held a position as professor of Computer Science for seven years at the University of Queensland in Australia. In 1989 he founded the company PNA, exclusively dedicated to delivering durable and tested business requirements, conceptual modeling, consulting, and educational services fully based on fact orientation. PNA currently employs about 30 people. Dr. Nijssen can be reached directly at [sjir.nijssen@pna-group.com](mailto:sjir.nijssen@pna-group.com).

## **Talk**

“Durable Modeling and Ever-Changing Implementation Technologies”

In the relative short history of information technology we have seen substantial improvements. However, between the wishes of the users and the implemented services

there is still in many cases an enormous gap. And the problem of very substantial cost overruns in the development of these services is still a serious challenge in too many cases. Today we aim to fill this gap between the requirements and the running services with what is called a durable model. The road toward a durable model has been a long one and an overview will be given since the 1960s. During the 1970s and 1980s the term conceptual model was used to refer to a durable model, with many contributions from the IFIP WG 2.6 conferences and the landmark publication of the ISO Technical Report TR9007 in 1987, “Concepts and Terminology for the Conceptual Schema and the Information Base.” Thereafter we discuss how durable modeling has evolved and been misused by various factions in the research and business world.

Since 2012 a co-creation has been established in The Netherlands consisting of government service organizations, universities, and innovative companies with the aim of developing an engineering protocol on how to “transform” laws, regulations, and policies into a durable model. The aim is to develop a national protocol that will be offered to all government departments and all other organizations in The Netherlands. Of course it will be offered to the world. We discuss the scientific foundation of this protocol, called CogniLex, as well as its practical version and report on experiences obtained so far. To the best of our knowledge, this is the most extensive protocol currently available. The skills of protocolled observation and transformation into facts, transforming the facts into another representation mode adequate for a specific purpose, and transforming the other representation mode back into verbalized facts are vital parts of any testing protocol, called *ex-ante* in *Terra Legis*. We demonstrate how certain legal domain protocol essentials like Hohfeld can be modeled in fact-based modeling, a durable modeling approach. We also demonstrate how fact-based modeling has been used to detect the needed extensions to the famous work of Hohfeld. If time permits, the transformation of such a durable model into UML, ER, OWL, SBVR, and DMN will be discussed.

# From (Security) Research to Innovation

Michele Bezzi

Sap Labs, France

## Short Bio

Michele Bezzi is Research Manager at SAP Product Security Research. He heads a group of researchers investigating applied research and innovative security solutions, addressing topics such as security tools for development, intrusion detection systems, and software security analysis.

He received his Master of Physics degree from the University of Florence in 1994 and his PhD in Physics from the University of Bologna in 1998. He has over 15 years' experience in industrial research in SONY, Accenture, and SAP. He has supervised several European projects, and has published more than 50 scientific papers in various research areas: security, privacy, pervasive computing, neural networks, evolutionary models, and complex systems.

## Talk

“From (Security) Research to Innovation”

I present some concrete examples of research projects, and show how these research results have been used in SAP products and processes.

The security research team addresses different topics such as security tools for development, intrusion detection systems, and software security analysis. For example, in recent years, we prototyped an application level intrusion detection software, now released as a product — SAP Enterprise Threat Detection (ETD) — able to detect attacks, in real time, on complex software landscape. We also devise tools to support developers in secure development, allowing, for example, security testing during the code writing phase, as well as innovative tools for security governance. In this talk, starting from these examples, I also discuss challenges and opportunities in transferring research results to industrial products or processes.

# Contents

## On The Move Academy (OTMA) 2015

### The 12th OnTheMove Academy PC Chairs' Message

Adaptation Mechanisms for Role-Based Software Systems . . . . .	3
<i>Martin Weißbach</i>	
Time Management in Workflows with Loops . . . . .	5
<i>Margareta Ciglic</i>	
Intercloud Communication for Value-Added Smart Home and Smart Grid Services . . . . .	10
<i>Philipp Grubitzsch</i>	
Dynamics in Linked Data Environments . . . . .	20
<i>Tobias Käfer</i>	

## Industry Case Studies Program (ICSP) 2015

### ICSP 2015 PC Chair's Message

#### Applications in Manufacturing

Continuous Data Collection Framework for Manufacturing Industries . . . . .	29
<i>Sudeep Ghimire, Raquel Melo, Jose Ferreira, Carlos Agostinho, and Ricardo Goncalves</i>	
Determination of Manufacturing Unit Root-Cause Analysis Based on Conditional Monitoring Parameters Using In-Memory Paradigm and Data-Hub Rule Based Optimization Platform . . . . .	41
<i>Prabal Mahanta and Saurabh Jain</i>	
“Wear” Is the Manufacturing Future: The Latest Fashion Hitting the Workplace . . . . .	49
<i>Gurbaksh Bhullar</i>	
Evaluating the Utilization of the ProcessGene Repository for Generating Enterprise-Specific Business Processes Models . . . . .	57
<i>Maya Lincoln and Avi Wasser</i>	

## IoT and CPS Applications

Impact of Internet of Things in the Retail Industry . . . . .	61
<i>Pradeep Shankara, Prabal Mahanta, Ekta Arora, and Guruprasad Srinivasamurthy</i>	

An Internet of Things (IoT) Based Cyber Physical Framework for Advanced Manufacturing . . . . .	66
<i>Yajun Lu and J. Cecil</i>	

## International Workshop on Enterprise Integration, Interoperability and Networking (EI2N) 2015

### EI2N'2015 Co-Chairs' Message

Subject-Oriented BPM as the Glue for Integrating Enterprise Processes in Smart Factories . . . . .	77
<i>Udo Kannengiesser, Matthias Neubauer, and Richard Heininger</i>	

Extended Service Modelling Language for Enterprise Network Integration . . .	87
<i>Qing Li, Peixuan Xie, Xiaoqian Feng, Hongzhen Jiang, and Qianlin Tang</i>	

SAIL: A Domain-Specific Language for Semantic-Aided Automation of Interface Mapping in Enterprise Integration . . . . .	97
<i>Željko Vuković, Nikola Milanović, Renata Vaderna, Igor Dejanović, and Gordana Milosavljević</i>	

Propelling SMEs Business Intelligence Through Linked Data Production and Consumption . . . . .	107
<i>Barbara Kapourani, Eleni Fotopoulou, Dimitris Papaspyros, Anastasios Zafeiropoulos, Spyros Mouzakitis, and Sotirios Koussouris</i>	

A Domain Specific Language for Organisational Interoperability. . . . .	117
<i>Georg Weichhart and Christian Stary</i>	

Understanding Personal Mobility Patterns for Proactive Recommendations . . .	127
<i>Ruben Costa, Paulo Figueiras, Pedro Oliveira, and Ricardo Jardim-Goncalves</i>	

A Real-Time Architecture for Proactive Decision Making in Manufacturing Enterprises . . . . .	137
<i>Alexandros Bousdekis, Nikos Papageorgiou, Babis Magoutas, Dimitris Apostolou, and Gregoris Mentzas</i>	

Osmotic Event Detection and Processing for the Sensing-Liquid Enterprise. . .	147
<i>Artur Felic, Spiros Alexakis, Carlos Agostinho, Catarina Marques-Lucena, Klaus Fischer, and Michele Sesana</i>	

PiE - Processes in Events: Interconnections in Ambient Assisted Living . . . .	157
<i>Monica Vitali and Barbara Pernici</i>	

## **International Workshop on Fact Based Modeling (FBM) 2015**

### **FBM PC Co-Chairs' Message**

Developing and Maintaining Durable Specifications for Law or Regulation Based Services . . . . .	169
<i>Diederik Dulfer, Sjir Nijssen, and Mariette Lokin</i>	
Fact Based Legal Benefits Services . . . . .	178
<i>Gert Veldhuijzen van Zanten, Paul Nissink, and Diederik Dulfer</i>	
Integrating Modelling Disciplines at Conceptual Semantic Level . . . . .	188
<i>Inge Lemmens</i>	
Using Fact-Based Modelling to Develop a Common Language: A Use Case . . . . .	197
<i>Inge Lemmens, Jan Mark Pleijasant, and Rob Arntz</i>	
Achieving Interoperability at Semantic Level . . . . .	206
<i>Inge Lemmens, Jean-Paul Koster, and Serge Valera</i>	
The Great Work of Michael Senko as a Part of a Durable Application Model . . . . .	216
<i>Peter Bollen</i>	
The Evolution Towards a Uniform Referencing Mode in Fact-Based Modeling . . . . .	226
<i>Peter Bollen</i>	
CogniLex: A Legal Domain Specific Fact Based Modeling Protocol . . . . .	235
<i>Mariette Lokin, Sjir Nijssen, and Inge Lemmens</i>	
Business Object Model: A Semantic-Conceptual Basis for Transition and Optimal Business Management . . . . .	245
<i>Roel Moberts, Ralph Nieuwland, Yves Janse, Martijn Peters, Hennie Bouwmeester, and Stan Dieteren</i>	
A Sustainable Architecture for Durable Modeling of Laws and Regulations and Main Concepts of the Durable Model . . . . .	254
<i>Marco Brattinga and Sjir Nijssen</i>	
1975-2015: Lessons Learned with Applying FBM in Professional Practice . . .	266
<i>Sjir Nijssen and Baba Piprani</i>	



Developing the Uniform Economic Transaction Protocol: A Fact Based Modeling Approach for Creating the Economic Internet Protocol . . . . .	276
<i>Johan Saton and Floris Kleemans</i>	

## **Workshop on Industrial and Business Applications of Semantic Web Technologies (INBAST) 2015**

### **INBAST 2015 PC Co-Chairs' Message**

Benchmarking Applied to Semantic Conceptual Models of Linked Financial Data . . . . .	289
<i>José Luis Sánchez-Cervantes, Lisbeth Rodríguez-Mazahua, Giner Alor-Hernández, Cuauhtémoc Sánchez-Ramírez, Jorge Luis García-Alcaráz, and Emilio Jimenez-Macias</i>	
Ontology-Driven Instant Messaging-Based Dialogue System for Device Control . . . . .	299
<i>José Ángel Noguera-Arnaldos, Miguel Ángel Rodríguez-García, José Luis Ochoa, Mario Andrés Paredes-Valverde, Gema Alcaraz-Mármol, and Rafael Valencia-García</i>	
Ontology-Based Integration of Software Artefacts for DSL Development . . . .	309
<i>Hele-Mai Haav, Andres Ojamaa, Pavel Grigorenko, and Vahur Kotkas</i>	
Towards an Adaptive Tool and Method for Collaborative Ontology Mapping . . . . .	319
<i>Ramy Shosha, Christophe Debruyne, and Declan O'Sullivan</i>	
Data Access in Cloud HICM Solutions. An Ontology-Driven Analytic Hierarchy Process Based Approach . . . . .	329
<i>Ricardo Colomo-Palacios, Eduardo Fernandes, and Juan Miguel Gómez-Berbís</i>	
Knowledge Management for Virtual Education Through Ontologies . . . . .	339
<i>Ana Muñoz, Victor Lopez, Katty Lagos, Mitchell Vásquez, Jorge Hidalgo, and Nestor Vera</i>	
Semantic Model of Possessive Pronouns Machine Translation for English to Bulgarian Language. . . . .	349
<i>Velislava Stoykova</i>	
Machine-Assisted Generation of Semantic Business Process Models . . . . .	357
<i>Avi Wasser and Maya Lincoln</i>	

## **International Workshop on Information Systems in Distributed Environment (ISDE) 2015**

### **ISDE 2015 PC Co-Chairs' Message**

Tool Chains in Agile ALM Environments: A Short Introduction . . . . .	371
<i>Saed Imran, Martin Buchheit, Bernhard Hollunder, and Ulf Schreier</i>	
Scale Up Internet-Based Business Through Distributed Data Centers . . . . .	381
<i>Liguo Yu, Alok Mishra, and Deepti Mishra</i>	
Distributed Architecture for Supporting Collaboration . . . . .	391
<i>Claude Moulin, Kenji Sugawara, Yuki Kaeri, and Marie-Hélène Abel</i>	
Evolving Mashup Interfaces Using a Distributed Machine Learning and Model Transformation Methodology . . . . .	401
<i>Antonio Jesus Fernandez-Garcia, Luis Iribarne, Antonio Corral, and James Z. Wang</i>	
An Architectural Model for System of Information Systems . . . . .	411
<i>Saleh Majd, Abel Marie-Hélène, and Mishra Alok</i>	
A Software Development Process Model for Cloud by Combining Traditional Approaches . . . . .	421
<i>Tuna Hacaloglu, P. Erhan Eren, Deepti Mishra, and Alok Mishra</i>	
Semantic Matching of Components at Run-Time in Distributed Environments . . . . .	431
<i>Javier Criado, Luis Iribarne, Nicolás Padilla, and Rosa Ayala</i>	

## **Workshop on Methods, Evaluation, Tools and Applications for the Creation and Consumption of Structured Data for the e-Society (META4eS) 2015**

### **META4eS 2015 PC Co-Chairs' Message**

Creating and Consuming Metadata from Transcribed Historical Vital Records for Ingestion in a Long-Term Digital Preservation Platform (Short Paper) . . . . .	445
<i>Dolores Grant, Christophe Debruyne, Rebecca Grant, and Sandra Collins</i>	
CoolMind: Collaborative, Ontology-Based Intelligent Knowledge Engineering for e-Society . . . . .	451
<i>Ioana Ciuciu and Bazil Pârv</i>	
Improving Software Quality Using an Ontology-Based Approach . . . . .	456
<i>Simona Motogna, Ioana Ciuciu, Camelia Serban, and Andreea Vescan</i>	

Historical Data Preservation and Interpretation Pipeline for Irish Civil Registration Records . . . . .	466
<i>Oya Beyan, P.J. Mealy, Dolores Grant, Rebecca Grant, Natalie Harrower, Ciara Breathnach, Sandra Collins, and Stefan Decker</i>	
Academic Search. Methods of Displaying the Output to the End User . . . . .	476
<i>Svetlana Popova, Ivan Khodyrev, Artem Egorov, and Vera Danilova</i>	
Estimating Keyphrases Popularity in Sampling Collections. . . . .	481
<i>Svetlana Popova, Gabriella Skitalinskaya, and Ivan Khodyrev</i>	
Semantic HMC: Ontology-Described Hierarchy Maintenance in Big Data Context . . . . .	492
<i>Rafael Peixoto, Christophe Cruz, and Nuno Silva</i>	
A Conceptual Relations Reference Model to the Construction and Assessment of Lightweight Ontologies. . . . .	502
<i>Cristóvão Sousa and António Soares</i>	
Motivators and Deterrents for Data Description and Publication: Preliminary Results (Short Paper) . . . . .	512
<i>Cristina Ribeiro, João Rocha da Silva, João Aguiar Castro, Ricardo Carvalho Amorim, and Paula Fortuna</i>	
<b>Mobile and Social Computing for Collaborative Interactions (MSC) 2015</b>	
<b>MSC 2015 PC Co-Chairs' Message</b>	
The mATHENA Inventory for Free Mobile Assistive Technology Applications . . . . .	519
<i>Georgios Kouroupetroglou, Spyridon Kousidis, Paraskevi Riga, and Alexandros Pino</i>	
Improving Social Collaborations in Virtual Learning Environments . . . . .	528
<i>Daniel González, Regina Motz, and Libertad Tansini</i>	
A Platform for Measuring Susceptibility and Authority of Social Network Members . . . . .	536
<i>Gregorio D'Agostino and Antonio De Nicola</i>	
Multimodal Systems: An Excursus of the Main Research Questions . . . . .	546
<i>Maria Chiara Caschera, Arianna D'Ulizia, Fernando Ferri, and Patrizia Grifoni</i>	
Co-creativity Process by Social Media within the Product Development Process . . . . .	559
<i>Alessia D'Andrea, Fernando Ferri, Patrizia Grifoni, and Tiziana Guzzo</i>	

**Ontologies, DataBases, and Applications of Semantics (ODBASE) 2015 Posters**

**ODBASE 2015 PC Co-Chairs' Message**

Towards Flexible Similarity Analysis of XML Data . . . . .	573
<i>Jesús M. Almendros-Jiménez and Alfredo Cuzzocrea</i>	
<b>Author Index</b> . . . . .	577